This *Lophuromys* would seem to be a paler form of the strong-coloured East-African *L. aquilus*. Possibly it may in turn prove to grade northwards into *L. flavopunctatus*, but all the specimens as yet available have longer tails than that animal.

XLII.—*Natural History Notes from the R.I.M.S. Ship 'Investigator,' Capt. T. H. Heming, R.N. (retired), commanding.*—Series III., No. 14. *Notes on the Skull of the Genus* Aulastomatomorpha, *with Descriptions of some new Deep-sea Fish.* By R. E. LLOYD, M.B., B.Sc., Capt. I.M.S., Surgeon-Naturalist, Marine Survey of India.

THE genus *Aulastomatomorpha*, first described by Alcock from a single specimen (Ann. & Mag. Nat. Hist., Oct. 1890), is unique among the Alepocephalidæ in possessing a tubular snout with a small terminal mouth.

A second specimen of the same species was obtained by the 'Investigator' in 1904 from 1100 fathoms off the Arakan coast, and in the following year a new species of this genus was obtained from 1005 fathoms in the Gulf of Oman.

Material has been thus obtained for a partial description of the skull of this genus and for a more particular description of the jaw suspensory apparatus, which can be fully elucidated without complete disarticulation and destruction of the specimen.

A notable feature in the structure of this skull is the forward position of the quadrate and the consequent prolongation of the symplectic and præopercle which articulate with it.

The quadrate is a thin fan-shaped bone situated almost entirely in front of the orbit, articulating with the pterygoid and articular in front, and with the symplectic and the præopercle behind. The large pterygoid is partially overlapped in front by the small toothless palatine.

The mesopterygoid, also a large bone, forms most of the lower floor of the orbit; in front it lies to the inner side of and above the quadrate and pterygoid.

The metapterygoid, a small bone, lies on and partially hides the symplectic.

The symplectic is of unusual length.

The maxilla, which is very loosely connected with the snout, consists of two separate crescentic particles, movable on one another.

The hyomandibular has the usual articulations.

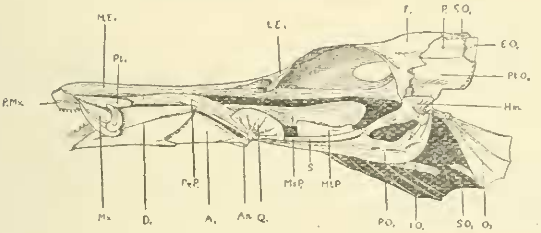
The opercular apparatus consists of the usual four bones. The præopercle is much prolonged forward to articulate with the quadrate. The sub- and interopercles are small and linear. The opercle, a very thin triangular bone, bears at its upper end a projecting knob, which is seen externally as a well-marked prominence halfway between the eye and the upper end of the branchial opening.

The lower jaw contains articular angular and dentary bones.

The upper part of the snout is formed by one long fibrous piece of bone intimately united with the vomer in front and dividing at the base of the snout into two limbs, between which the fore parts of the frontals fit. This long bone represents an ethmoid and two lateral ethmoids; a suture separating these elements could not be found.

In the cranium proper the supraoccipital articulates with the frontals and lies between the small parietals, separating them from each other.

The frontals are not fused in the middle line.



Skull of *Aulastomatomorpha phosphorops.*

Reference letters.

Q. = Quadrate.
A. = Articular.
An. = Angular.
D. = Dentary.
Pr.P. = Pterygoid.
Ms.P. = Mesopterygoid.
Mt.P. = Metapterygoid.
S. = Symplectic.
P.O. = Præopercle.
I.O. = Interopercle.
S.O. = Subopercle.
O. = Opercle.

Hm. = Hyomandibular.
Pt.O. = Pterotic.
E.O. = Epiotic.
P. = Parietal.
F. = Frontal.
S.O. = Supraoccipital.
L.E. = Lateral ethmoid.
M.E. = Mesethmoid.
Pl. = Palatine.
Mx. = Maxilla.
P.Mx. = Premaxilla.

Aulastomatomorpha cæruleiceps, sp. n.

B.	D.	A.	P.	V.
5	18	40	7	6

Closely resembles *A. phosphorops*, from which it differs in the following particulars:—

1. The premaxillary teeth are fewer in number and are relatively larger; they are arranged in two sets, an anterior closely set group of eight or nine, and a posterior group of three with wide intervals between.

2. The interorbital space is wider than half the diameter of the eye.

3. The head is covered with a firm smooth skin just as in *A. phosphorops*, but in the new species the colour of this skin is a dark slaty blue. The colour of the rest of the body is brownish black. The bases of the fins have a blue tinge. The blue colour is partially preserved in spirit.

4. The total height is only $\frac{1}{8}$ of the total length excluding the caudal fin, but as this specimen is smaller and younger than the type of *A. phosphorops*, this character does not, perhaps, constitute a specific difference.

One damaged specimen, 18 cm. long, from 1005 fathoms in the Gulf of Oman.

The wide distribution of the three specimens and the close similarity in the depths from which they were obtained are points worth noting.

Species.	Depth.	Locality.
A. phosphorops (1st specimen) .	1000	Arabian Sea, off the Laccadives.
A. phosphorops (2nd specimen).	1100	Bay of Bengal, off Arakan.
A. cæruleiceps	1005	Gulf of Oman, off Muscat.

Narcetes affinis, sp. n.

B.	A.	D.	V.	P.	L. l.	L. tr.
7	14	17	10	13	73	9+1+13

Resembles *N. pluriserialis* (Gorman), and differs from *N. erimelas* (Alcock) in the following particulars:—

1. There are seven branchiostegal rays.

2. The first ray of the anal fin is vertically below the eighth ray of the dorsal.

3. There is one enlarged tooth on either side of the vomer.

In all its proportions this species resembles *N. pluriserialis* very closely.

It differs from *N. pluriserialis* in the following respects:—

1. The teeth in the maxillæ are in two series, an outer series of small teeth and an inner series of larger ones.

2. There are only seventy-three scales in the lateral line.
3. The anterior of the two nostrils is relatively larger.

The scales of the lateral line are large, measuring as much as $\frac{1}{4}$ inch in length.

The total length of the single specimen is 14 inches.

In the middle and hinder parts of the fish, one inch of the lateral line contains six scales, but in the front these scales overlap one another to a much further extent, so that one inch contains eight or nine scales.

In the anterior half of each scale of the lateral line is the wide opening of its tube; the margin of this opening is completed in front by a semicircular notch in the hinder edge of the scale which lies next in front.

Colour almost black; head and lining of gill jet-black.

One specimen, 14 inches long, from 1005 fathoms in the Gulf of Oman.

It is notable that *N. pluriserialis* (Gorm.), which this species resembles in many ways, came from 1010 fathoms in the Gulf of Panama.

Raia Philipi, sp. n.

The greatest breadth of the disk is equal to the greatest length, including the ventral fins.

The ends of the snout and tail are equidistant from the cloacal orifice. The snout is slender and prominent. The interorbital space is $3\frac{2}{3}$ in the length of the snout, measured from an eye or the middle of the mouth.

The anterior borders of the pectoral fins, which are somewhat sinuous, together form an angle of about 85°.

The lateral angles are rounded. The spiracle is large, its greatest diameter equals that of the eye.

Numerous small spinules occur on the upper surface of the tip of the snout and close to the antero-lateral margin in its posterior half only.

The superciliary ridge bears four spines in front and three behind.

There are five mid-dorsal spines in the branchial region.

Between the ocellus and the margin of the pectoral fin is a group of lanceolate denticles pointing inwards (probably characteristic of the male).

The whole lower surface of the snout is covered with fine denticles.

On the dorsum of the tail are three somewhat irregular rows of spines. The tail is naked below, the sides of the tail are spiny.

The mouth is widely but distinctly V-shaped; in width it is $1\frac{7}{8}$ in the length of the snout.

There are eighty rows of teeth in the upper jaw and sixty in the lower. Teeth low and triangular, on a rhomboidal base.

The edges of the nasal valves are deeply fimbriated and are united across the middle line by a distinct fold of skin, which is separated from the upper jaw by a deep curved groove.

The dorsal fins are equal in length; the distance between them is greater than the length of either. Caudal fin small.

Colour uniform brown above, with a dark ocellus at the base of each pectoral fin, surrounded by a paler ring.

Uniform white below; the tail shows dark mottling on its lower surface.

One small male specimen, measuring 36 cm. in its greatest length and 23 cm. in its greatest breadth, was taken from 130 fathoms in the Gulf of Aden.

Raia reversa, sp. n.

The greatest breadth of the disk is equal to the length from the snout to the root of the tail.

The cloaca is slightly nearer the end of the snout than the end of the tail.

The interorbital space is $\frac{1}{4}$ the length of the snout measured from an eye or the middle of the mouth.

The anterior borders of the pectoral fins are sinuous and together form an angle of about 80°.

The snout is prominent.

The lateral angle of the pectoral fins is rounded.

The spiracle is large; its greatest diameter equals that of the eye.

The skin over the skull, but not over the snout, is covered with fine denticles.

The anterior half or more of the pectoral fins is covered with small denticles.

There are two series of larger spines on the pectoral fins, one series of about twenty opposite the shoulder-girdle (male characteristic probably) and another of about fifteen opposite the eye.

There is one large white stellate spine in front of the eye and two or three smaller ones behind.

There are four or five similar spines in the mid-dorsal line.

On the dorsum of the tail are three regular rows of large spines, those of the middle row being about half as numerous as those of the lateral rows.

The sides of the tail are spiny.

The lower surface of both disk and tail is smooth and devoid of spines.

The two dorsal fins are equal in length and are in contact at their bases; the caudal fin is a minute fold.

The mouth is transverse in its outer part and curved in the middle; its breadth is exactly half the length of the snout.

There are forty-two rows of teeth across both upper and lower jaw.

The teeth in the middle of the series are long and curved; their bases are heart-shaped.

Colours in the fresh state:—The upper surface of the disk is pure white, passing into dark grey at the margin of the pectoral fins. The upper surface of the pelvic fins and claspers is grey. The iris is black, but the pupil has a white milky appearance: the anatomical cause of this was unfortunately not made out in the fresh state. The entire lower surface is purplish black. In consistency the whole body is soft and flabby; when taken from the trawl it was rolled up in a cylindrical posture.

The single specimen (a male), measuring 60 cm. in its greatest length and 33 cm. in its greatest breadth, was taken from 820 fathoms in the Arabian Sea off the Baluchistan coast.

In the same trawl was obtained a black pillow-shaped egg with four hollow horns at the corners; this measures 2½ by 1½ inches. The horns are not equal in length: those of one pair are 2½ inches long and are separated by a straight border; those of the other pair are 1½ inch long and are separated by a tongue-shaped projection of the border, which constitutes a smaller fifth horn.

The most characteristic features of this species are the soft flabby consistency in the fresh state and the remarkable coloration, which suggested the name *R. reversa*.

In concluding these notes I must acknowledge my indebtedness to Lt.-Col. A. Alcock, I.M.S., F.R.S., who has kindly given me much help and advice in their production.

Figures of these four species will be subsequently published in the "'Investigator' Illustrations."